



WITHDRAWN

PROVINCE OF ONTARIO.

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*HIGH SCHOOLS*

AND

COLLEGIATE INSTITUTES.

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Intermediate Examination Papers.

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JUNE, 1876.







# Province of Ontario.

## COLLEGIATE INSTITUTES AND HIGH SCHOOLS.

INTERMEDIATE EXAMINATION June, 26th—29th, 1876.

*Examiners*—THE HIGH SCHOOL INSPECTORS AND SIX SUB-EXAMINERS.

Candidates are required to observe the regulations strictly.

No. 1.

### NATURAL PHILOSOPHY.

1. State the principle of the Parallelogram of Forces. Explain the meaning of the terms employed in your statements. Shew that if four forces acting on a point be represented by the sides of a rectangle taken in order, they will be in equilibrium.
2. Apply the Triangle of Forces to find the least horizontal force necessary to draw a wheel four feet in diameter and weighing 10 cwt. over an obstacle the height of which is six inches, situated on the horizontal plane on which the wheel rests.
3. Define the moment of a force with respect to a given point.  
A uniform beam A B, whose weight is 100 lbs. and length 50 feet, rests with one end (A) on a horizontal plane A C, and the other end against a vertical wall C B. If a string C A, equal in length to C B, prevents the beam from sliding, find the tension of the string.
4. In the system of pulleys in which each pulley hangs by a separate string, a platform is suspended from the lowest block; what force must a man who weighs 180 pounds, standing on the platform, exert to sustain himself when there are three movable pulleys.
5. State the principle of *virtual velocities*, and apply it to find the relation between the power and the weight in the inclined plane.
6. A vessel is closed at the top; through the lid goes a pipe which reaches to the height of 50 feet; the lid has an area of 49 square inches, and the pipe a cross section of 1 square inch: suppose the vessel and pipe to be full of water, what is the force tending to open the lid?
7. Define clearly what is meant by specific gravity. Is there any difference in specific gravity between 4 lbs. of iron and 2 lbs. of the same metal?  
A body whose specific gravity is 3.5 weighs 4 lbs. in water, what is its real weight?
8. Sketch the common pump, describing its action and stating the limitation to which this is subject.  
If the diameter of the piston is 6 inches, and the height of the spout above the well 25 feet, what force must act along the piston-rod to work the pump?
9. Describe the common barometer and point out the principle on which its action is based.  
If the radii of the cistern and tube be 3 and 1, determine the true variation corresponding to an apparent rise or fall of one inch.



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## COLLEGIATE INSTITUTES AND HIGH SCHOOLS.

### INTERMEDIATE EXAMINATION June 26th-28th, 1876.

Examiners—The High School Examiners and Sir Geo. R. Williams.

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No. 1.

### NATURAL PHILOSOPHY.

1. State the principle of the Parallelogram of Forces. Explain the meaning of the term "resultant" in your own words. Show that if two forces acting on a point be represented by the sides of a triangle taken in order, they will be in equilibrium.
2. Apply the Triangle of Forces to find the least horizontal force necessary to draw a wheel over a curb 1 foot high and weighing 10 cwt. over an obstacle the height of which is 6 inches, situated on the horizontal plane on which the wheel rests.
3. Define the moment of a force with respect to a given point.  
A uniform beam A B, whose weight is 100 lbs., and length 50 feet, rests with one end (A) on a horizontal plane A C, and the other end against a vertical wall D E. It is supported by a rope in length to C E. Prove that the beam is in equilibrium, and find the tension of the rope.
4. In the system of pulleys in which each pulley hangs by a separate string, a pulley is suspended from the bottom block; what force must a man who weighs 150 pounds standing on the ground exert to raise himself when there are three movable pulleys?
5. State the principle of virtual velocities and apply it to find the relation between the power and the weight in the inclined plane.
6. A vessel is closed at the top; through the lid goes a pipe which reaches to the bottom at 50 feet; the lid has an area of 49 square inches, and the pressure within is 2 square inches; suppose the vessel and pipe to be full of water, what is the force tending to open the lid?
7. Define density, which is meant by specific gravity. Is there any difference in density between 4 lbs. of iron and 2 lbs. of the same metal?  
A body whose specific gravity is 3.5 weighs 1 lb. in water, what is its real weight?
8. Describe the common pump, describing its action and stating the principle on which it is founded.  
It has a diameter of 12 inches, and the height of the piston above the well is 25 feet, what force would be required to work the pump?
9. Describe the common barometer and point out the principle on which its action is based.  
If the height of the column and tube is 3 feet, determine the true vertical atmospheric pressure to an accuracy of 1/10 of an inch.



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No. 2.

### CHEMISTRY.

1. How would you prepare Hydrogen? State fully by what means you would show its most important properties.
2. Describe fully the modes of decomposing water, which you have seen. You are asked to say whether a given specimen of water is hard or soft, how will you determine the fact? If the water is hard, describe (with reasons) all the means by which you can make it soft.
3. State all the forms in which Carbon is found in nature. By what experiments would you show its important properties. You are given a black substance like coal, and asked to say whether it is carbon or not; how will you determine this?
4. How would you obtain Carbonic Acid from chalk—represent the reaction by an equation. A current of atmospheric air passes up through a bright coal fire, state all the changes which it undergoes till it enters the atmosphere again.
5. How is Chlorine prepared? State the experiments by which you would show its properties. On what does its bleaching power depend? You are given a piece of calico, and requested to bleach it—state fully how you would proceed.
6. When an ordinary friction match is lighted, what gases are given off? Describe the properties of any of them.
7. State what substances are represented by the following formulas, and mention any experiments in which you have seen any of them occur:

$\text{Mn O}_2$ ,  $\text{Fe}_3 \text{ O}_4$ ,  $\text{P}_2 \text{ O}_5$ ,  $\text{Zn SO}_4$ ,  $\text{NH}_4 \text{ Cl}$ ,  $\text{CaCo}_3$ .





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No. 3.

### L A T I N .

A. CÆSAR.

- I.—1. What was Cæsar's full name, and what did each part of that name denote?  
2. Write a short account of Cæsar, and mention his most famous Roman contemporaries.  
3. Translate :

Concilium dimittit, Liscum retinet ; quærit ex solo ea quæ in conventu dixerat. Dicit liberius atque audacius. Eadem secreto ab aliis quærit ; reperit esse vera. Ipsum esse Dumnorigem, summa audacia, magna apud plebem propter liberalitatem gratia, cupidum rerum novarum ; complures annos portoria, reliquaque omnia Æduorum vectigalia, parvo pretio redempta habere, propterea quod illo licente contra licere audeat nemo.

- a. Parse *solo*, *redempta*, and *licente*.
- b. Conjugate *reperit* and *audeat* ; and give the other degrees of comparison of *liberius*, *audacius*, *parvo*.
- c. Explain the derivation of *secreto*, *vectigalia*, and *nemo*.
- d. Decline *eadem*, *aliis*, *nemo*.
- e. Sketch a rough map of Gaul, showing its divisions as given by Cæsar, and its chief tribes.

II.—Translate :

Id ne accideret, magnopere sibi præcavendum Cæsar existimabat ; namque omnium rerum quæ ad bellum usui erant, summa erat in eo oppido facultas ; idque natura loci sic muniebatur, ut magnam ad ducendum bellum daret facultatem, propterea quod flumen Dubis, ut circino circumductum, pæne totum oppidum cingit ; reliquum spatium, quod est non amplius pedum sexcentorum, qua flumen intermittit, mons continet magna altitudine, ita ut radices ejus montis ex utraque parte ripæ fluminis contingant. Hunc murus circumdatus arcem efficit et cum oppido conjungit.

- a. "Oppidum"—"flumen"—Give the modern names.
- b. Mark the quantity of the penult. in 'accideret,' 'circino,' 'radices,' 'utraque,' 'circumdatus.'
- c. Explain the construction of *sibi*, *usui*, and *pedum*.
- d. "Id ne accideret."—Explain what is meant.

III.—Translate into Latin : (1) The Germans could not be restrained, the day before, from hurling darts upon our (men).

- (2) Ariovistus demanded that Cæsar should not bring any foot-soldier to the conference ; "he was afraid" (he said) "that he should be entrapped by him, by an ambuscade."
- (3) They returned on the 20th of March.
- (4) P. Considius was regarded as the most skilful in military matters.
- (5) Cæsar sends forward cavalry to see in what direction the enemy are marching.

[Over.]



B. VIRGIL.

I.—1. (a) What is the subject of the *Æneid*? (b) To what class of poems does it belong? (c) Mention any ancient or modern poems of this class. (d) When did Virgil live, and who were his chief patrons and friends?

II.—“Et si fata deûm, si mens non læva fuisset,  
Impulerat ferro Argolicas fœdare latebras.”

- (a) Translate these lines, and mention anything peculiar in their construction.  
(b) What is the proper meaning of *læva*? What is its meaning here? and how did it come to have that meaning?

III.—Translate:

- (a) Nec requievit enim, donec, Calchante ministro, --  
Sed quid ego hæc autem nequidquam ingrata revolve?  
Quidve moror, si omnes uno ordine habetis Achivos,  
Idque audire sat est? Jamdudum sumite pœnas,  
Hoc Ithacus velit, et magno mercentur Atridæ.  
(b) Tum vero tremefacta novus per pectora cunctis  
Insinuat pavor; et scelus expendisse merentem  
Laocoonta ferunt, sacrum qui cuspide robur  
Læserit, et tergo sceleratam intorserit hastam.  
(1) Parse *requievit, velit, mercentur, expendisse*.  
(2) *Læserit*—Why in the subjunctive mood?  
(3) Decline *pectora, robur*.

IV.—Explain the meaning of the following:

- (1) “Dives opum;” (2) “sumere pœnas;” (3) “Larissæus Achilles.”

V.—Scan these verses:

- (a) Nen populum antiqua sub religione tueri.  
(b) Ultro Asiam magno Pelopea ad mœnia bello.  
(c) Ædificant sectaque intexunt abiete costas.

Mark all the quantities in the last verse, and give the rule for such of them as are not determined by position.

VI.—(1) Make a list of Latin words which have a different meaning in the singular and plural.

- (2) Write down the compounds of *claudio*, *habeo*, and *rego*, with *cum*, *de*, and *ex*.



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No. 4.

### FRENCH.

I. VOLTAIRE, CHARLES XII, LIV. I.

1. Translate :

- (a) Le jeune sélictar l'éleva à ce poste glissante, en attendant qu'il *pût* se placer lui-même, et Jussuf, sa créature, n'eut d'autre emploi que d'apposer les sceaux de l'empire aux volontés du favori. La politique de la cour ottomane *parut* toute changée dès les premiers jours de ce vizirat.
- (b) Son extrême générosité et le peu de cas qu'il *faisait* de l'argent l'empêchaient de *sentir* qu'il y avait d'avilissement dans cette proposition ; il ne la faisait que pour s'attirer un refus ; et pour avoir un nouveau prétexte de ne point partir ; mais c'était être réduit à d'étranges extrémités que d'avoir besoin de pareils artifices.
- (c) Les chapelains du roi se *mirent* aussi à genoux devant lui, le conjurant de ne pas exposer à un massacre certain les malheureux restes de Pultava, et surtout sa personne sacrée ; l'assurant de plus que cette résistance était injuste, qu'il violait les droits de l'hospitalité en s'opiniâtrant à résister par force chez des étrangers qui l'avaient si long temps et si généreusement secouru.

- 2. Parse all the verbs in italics in the above extracts, giving the principal parts of each.
- 3. Explain the meaning of 'les échelles du levant,' 'les queues de cheval arborées,' 'la porte qui donnait dans son appartement à coucher.'
- 4. Render into French : "less than six months ;" "much more than I ;" "there did not escape him a word of impatience."
- 5. What is the difference between *en* and *dans*, *devant* and *avant*, *pas* and *point* ? When may *pas* and *point* be suppressed as parts of the negative ?
- 6. (a) *Toute changée.*—Give rules for the adverbial use of *tout*, with examples.  
(b) *Conjurant.* Does the present participle ever agree with its noun ?
- 7. *Les malheureux restes de Pultava.* Give a full explanation of the event here referred to.
- 8. *Sa personne sacrée.*—Why called *sacrée* ? Give illustrations of this expression. When is *personne* masculine ?
- 9. Say briefly what you know of the author of this work.

[Over.]



## II. GRAMMATICAL QUESTIONS.

1. Write down the plural of *chef d'œuvre*, *bijou*, *trou*, *cieul*, *œil*, *solo*, and *contre-danse*; also the feminine of *dieu*, *empereur*, *roi*, *chanteur*, *oncle*, *roux*, *vieux*, *protecteur*.
2. What adverbs are formed from the adjectives *nouveau*, *fou*, *lent*, *constant*?
3. When do *cent* and *vingt* take the mark of the plural? Give examples.
4. Write the present and past participles; also the third person singular and the first person plural present subjunctive of *aller*, *venir*, *couvrir*, *vaincre*, *mourir*, *mouvoir*, *vouloir*, and *savoir*.
5. Write the imperative of *se taire*, *s'en aller*, and *dire*.
6. Explain the rule for the concord of the past participle when preceded by *avoir* and *être*. Give examples.
7. Express in French (a) I doubt not that he will come. (b) It would be just for you to do it. (c) He is the most learned man I know. (d) Go for some one who can help us. (e) Think of me. (f) What do you think of him?

## III. ELEMENTARY READER.

1. Translate :

La cigale, ayant chanté  
 Tout l'été,  
 Se trouva fort depourvu  
 Quand la bise fut venue ;  
 Pas un seul petit morceau  
 De mouche ou de vernisseau.  
 Elle alla crier famine  
 Chez la fourmi sa voisine  
 La priant de lui prêter  
 Quelque grain pour subsister  
 Jusqu'à la saison nouvelle.  
 Il vous paierai, lui dit-elle,  
 Avant l'août, foi d'animal,  
 Intérêt et principal.  
 La fourmi n'est pas prêteuse ;  
 C'est là son moindre défaut.

2. Translate into French :

- (a) When the merchant heard that, he took a large plank, and tied his wife and his two children to it.
- (b) You have dropped your handkerchief, Miss : allow me to pick it up for you.
- (c) My soup is too cold ; bring me some warmer, if you please, James.



# Province of Ontario.

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No. 5.

### GERMAN.

Translate into English :

Wer reitet so spät durch Nacht und Wind?  
Es ist der Vater mit seinem Kind;  
Er hat den Knaben wohl in dem Arm,  
Er faßt ihn sicher, er hält ihn warm.

„Mein Sohn, was birgst du so bang dein Gesicht? „  
„Siehst, Vater, du den Erlkönig nicht?  
Den Erlkönig mit Kron' und Schweif? „  
„Mein Sohn, es ist ein Nebelstreif. „

„Du liebes Kind, komm, geh' mit mir!  
Gar schöne Spiele spiel' ich mit dir,  
Manch' bunte Blumen sind an dem Strand,  
Meine Mutter hat manch gülden Gewand. „—GÖTHE.

Heinrich war ein fünfzehnjähriger Jüngling voll guter Vorsätze, die er selten hielt, und voll Fehler, die er täglich bereuete; er hatte seinen Vater und seinen Lehrer innig lieb, aber seine Vergnügungen oft stärker; er wollte gern das Leben für beide aufopfern, aber nicht seinen Willen; und seine aufbrennende Seele entriß denen die er liebte nicht mehr Thränen als ihm selber. So irrte schmerzlich sein Leben zwischen Bereuen und Sündigen umher, und zuletzt nahm sein langer Wechsel zwischen guten Entschlüssen und verderblichen Fehlritten seinen Freunden und sogar ihm die Hoffnung der Besserung.—JEAN PAUL FRIEDRICH RICHTER.

1. Decline in both numbers with the definite article Vater, Kind, Knabe, Sohn, and Krone.
2. Decline in both numbers seine aufbrennende Seele, der lange Wechsel, schönes Spiel.
3. Give the present infinitive, the first person singular imperfect indicative, and the past participle of the verbs occurring in the extract from Göthe.

[Over.]



4. Conjugate the present indicative, the imperfect subjunctive, and the imperative of *nehmen*, *entreißen* and *aufopfern*.
5. *Was birgst du*. For what is *was* used here?
6. *So irrte schmerzlich sein Leben*. Why is the verb placed before its subject in this sentence.
7. Make a list of the terminations which indicate that the nouns which possess them are feminine.

Translate into German :

A

I have lost my book.  
 He who is contented is rich.  
 My father is called Henry.  
 What day of the month is it?  
 These trees are higher than ours.  
 I would be happier if I had books and friends.

[Note that the German words for the following exercise are given below in the order in which they are to be placed.]

B.

#### THE COW, THE GOAT, THE SHEEP, AND THE LION.

A cow, a goat, and a patient sheep went a-hunting in company with the lion. At last they caught a very large deer. Then the lion divided it, and said :—"The first part I take, because I am the Lion ; the second you must award to me on account of my valour ; the third must fall to my lot, because I am stronger than you ; and woe to him who will lay his hands on the fourth !"

Ein Kuh, ein Ziege und ein geduldig Schaf gehen in Gesellschaft mit der Löwe auf der Jagd. Er haben endlich ein sehr groß Hirsch fangen. Da theilen der Löwe und sprechen : Der erst Theil nehmen ich weil ich der Löwe seyn ; der zweite, müssen du ich wegen mein Tapferkeit zuerkennen ; der dritte müssen ich zufallen, weil ich stark seyn als du ; und wehe der der sich an der vierte vergreifen werden !"

C.

#### THE ASS AND THE WOLF.

An ass met a hungry wolf. "Have compassion on me," said the trembling ass ; I am a poor sick animal ; only see, what a thorn I have run into my foot !"



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No. 6.

### ALGEBRA.

1. State the rules for the addition and subtraction of Algebraic quantities. Express in the simplest form

$$\begin{aligned} & (b + c - a)x + (c + a - b)y + (a + b - c)z \\ & (c + a - b)x + (a + b - c)y + (b + c - a)z \\ & (a + b - c)x + (b + c - a)y + (c + a - b)z. \end{aligned}$$

2. State and prove the Index Laws. Assuming these to be general, interpret  $x^{-m}$ .  
Find the products in the following cases :

(1)  $(x^3 + 6x^2y + 12xy^2 + 8y^3)(x^3 - 6x^2y + 12xy^2 - 8y^3)$ .

(2)  $(a + b + c)(b + c - a)(c + a - b)(a + b - c)$ .

3. Prove the rule of signs in Division.

Divide : [Apply Horner's method to (1)]

(1)  $x^6 - 22x^4 + 60x^3 - 55x^2 + 12x + 4$  by  $x^2 + 6x + 1$ .

(2)  $x^4 + 9 + 81x^{-4}$  by  $x^2 - 3 + 9x^{-2}$       (3)  $x^n - 1$  by  $x^n - 1$ .

4. Define the highest Common Measure of two or more quantities ; and prove the principle on which depends the rule for finding the H. C. M.

Find the H. C. M. of

$$3x^3 + 4x^2 - 3x - 4 \text{ and } 2x^4 - 7x^2 + 5.$$

[SEE OVER]



5. Simplify the following expressions :

$$(1) \quad \frac{x^2 + y^2 + z^2 + 2xy}{x^2 - y^2 - z^2 + 2yz}.$$

$$(2) \quad \frac{20x^4 + x^2 - 1}{25x^4 + 5x^3 - x - 1}.$$

6. Find the square roots of

$$(1) \quad 4x^{4m} - \frac{4}{3}x^{5m} + \frac{1}{9}x^{6m}.$$

$$(2) \quad \frac{a^2}{b^2} + \frac{b^2}{c^2} + \frac{c^2}{a^2} - \frac{a}{c} - \frac{c}{b} + \frac{b}{a}.$$

7. Distinguish between an algebraic equation and an identity. Solve

$$(1) \quad \sqrt[3]{1-2x} + \sqrt[3]{1+2x} = 3.$$

$$(2) \quad \frac{x-ay}{b} = 1 = \frac{ax+y}{c}$$

$$(3) \quad \frac{x-2}{x+2} + \frac{x+2}{x-2} = 2 \cdot \frac{x+3}{x-3}$$

8. A person bought a certain number of oxen for \$320. If he had been able to purchase four more for the same sum, each would have cost him \$4 less. Find the number of oxen. Explain the negative result.

9. (1) If  $\frac{a}{b} = \frac{c}{d}$  show that  $\frac{a^2 + 2ab + 3b^2}{c^2 + 2cd + 3d^2} = \frac{b(a-3b)}{d(c-3d)}$

(2) Find the remainder where  $x^3 - nx^2 + nx - r$  is divided by  $x - c$ .

(3) Find the value of  $x^6 - 200x^5 + 198x^4 + 200x^3 - 197x^2 - 397x$  when  $x = 199$ .

10. Three towns, A, B, C, are at the angles of a triangle. From A to C, through B the distance is 82 miles ; from B to A through C, is 97 miles ; and from C to B through A, is 89 miles. Find the direct distances through the towns.



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No. 7.

#### BOOK-KEEPING.

1. Explain the difference between Single and Double Entry ; and mention the chief advantages possessed by the latter.
2. In what different senses is the term “ Stock ” employed in Book-keeping ?
3. I have dealings with A and B. I pay B a promissory note of A's on account, and balance B's account with cash. Give my own and B's Journal entries of this transaction.
4. Explain the terms “ Trial Balance,” “ Balance Sheet,” “ Profit and Loss Acct.”
5. Write a form of “ A Foreign Bill of Exchange,” “ An Acceptance,” “ An Account Current.”
6. Bo't of Blundell, Spence & Co. goods amounting to \$4,500. Gave in payment, cash, \$1,500 ; J. Miller's note for \$1,000, due in 3 mo's, less discount \$20 ; my own note for \$1,000 ; the balance remains on account. Give my own, and Blundell, Spence & Co's Journal entries of this transaction.
7. I consign to J. H. & Co., Montreal, a cargo of flour, which is sold for \$18,000. The charges, commission, &c., amount to \$172. I receive in payment a sight draft on the Bank of Montreal, for \$10,000, and draw on J. H. & Co., at 30 days, for the balance. I discount this draft in the Bank of Commerce, and place the proceeds (the discount being \$66.66,) to my credit in that Bank. What are my Journal entries of this transaction ?
8. What Day-Book entries would be journalized as follows :

(a) Bills Payable, Dr. to Cash,.....	\$150
(b) Sundries, Dr. to J. Wilson,.....	\$3000
Merchandize, .....	\$2000
Cash, .....	\$1000
9. How are the following accounts respectively balanced : Interest, Cash, Merchandize, Stock, Expenses ?







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No. 8.

“The signet-ring young Lewis took,  
With deep respect and altered look ;  
And said :—‘This ring our duties own ;  
And pardon, if to worth unknown,  
In semblance mean obscurely veiled,  
Lady, in aught my folly failed.  
Soon as the day flings wide his gates,  
The King shall know what suitor waits.  
Please you, meanwhile, in fitting bower  
Repose you till his waking hour ;  
Female attendance shall obey  
Your hest, for service or array.  
Permit I marshal you the way.’  
But, ere she followed, with the grace  
And open bounty of her race,  
She bade her slender purse be shared  
Among the soldiers of the guard.”

*The Lady of the Lake. Canto VI.*

1. Divide vv. 9—17 into propositions, and fully analyse them.
2. Parse ‘pardon,’ ‘to,’ and ‘unknown,’ l. 4; ‘soon,’ ‘as,’ and ‘wide,’ l. 7; ‘you,’ l. 10; ‘for,’ l. 12; ‘you,’ l. 13; ‘with,’ l. 14; ‘purse,’ l. 16.
3. Give the derivation of ‘signet,’ ‘respect,’ ‘alter,’ ‘duty,’ ‘semblance,’ ‘lady,’ ‘aught,’ ‘folly,’ ‘repose,’ ‘obey,’ ‘marshal,’ ‘grace,’ ‘bounty,’ ‘service.’
4. Explain the meaning of line 3, of ‘signet,’ and of ‘hest.’
5. The syllables *et*, *re*, *be*, *per*, *tend*, *unce*, occur in many English words. State the meaning and explain the origin of each.
6. Render the passage in prose.
7. Give an account of the different uses of ‘it.’
8. On what basis are verbs classified into strong and weak? State which of the verbs in the passage at the head of this paper are strong.







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COLLEGIATE INSTITUTES AND HIGH SCHOOLS.

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INTERMEDIATE EXAMINATION, June 26th—29th, 1876.

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*Examiners*—THE HIGH SCHOOL INSPECTORS, AND SIX SUB-EXAMINERS.

Candidates are required to observe the regulations strictly.

No. 9.

## D I C T A T I O N .

“In the present edition of this work the Editor has endeavoured so to arrange the various sections of the science, as to exhibit to the inquiring reader the various movements and physical peculiarities of the different members of the solar system without embarrassing his mind with mathematical symbols, for though symbolical explanations may seem to the advanced student to be a necessary adjunct for the proper elucidation of the different problems, yet it not unfrequently happens that the reader, with less mathematical proficiency would altogether fail in the study of this science, were it not for the assistance afforded by popular and elementary works written in a language comprehended by all. To the student of the higher or mathematical branches of astronomy, this work, however, will also be found interesting and instructive, as he will find information of the most valuable kind in it, for much of which he may look in vain in works of higher pretensions.”—*Preface to Lardner and Dunkin's Handbook of Astronomy.*





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#### ARITHMETIC.

1. Simplify  $\frac{4}{5}(3\frac{1}{3} + 1\frac{1}{4})\text{£} + \frac{1\frac{1}{8} - \frac{1}{3} \text{ of } 1\frac{5}{6}}{\frac{1}{10} \text{ of } 3\frac{1}{3} + \frac{1}{7}\frac{3}{2}} \times .95 \text{ of } 5s. + \frac{8 \cdot 4}{.012}d.$
2. A and B can do a piece of work in  $3\frac{1}{4}$  days, A and C in  $5\frac{1}{5}$  days, and B and C in  $5\frac{1}{7}$  days. If \$15 be paid for the work, what wages does each man earn per day?
3. A person buys a lot of land at \$120 an acre, and by selling a portion in allotments he makes 90% on all he sells, so that after reserving 20 acres, he finds that he has realized on the remainder \$840 more than the entire lot cost him. How many acres did he buy?
4. A Toronto Merchant owes £900 in Liverpool, G. B. He determines to remit to Paris at 5 francs 50 centimes per \$1; thence to Hamburg at 185 francs per 90 marcs; thence to Amsterdam at  $18\frac{1}{2}$  stivers per marc; thence to Liverpool at 220 stivers per £1 sterling: how much must he remit to discharge his debt in Liverpool, and how much does he gain over direct exchange at  $9\frac{1}{2}\%$  premium?
5. A man invests \$19,450 in Bank of Montreal Stock at 194, and \$19,850 in Bank of Toronto Stock at 198, paying his broker, in each case,  $\frac{1}{2}\%$  on the amount of stock purchased. If the former pays a half-yearly dividend of  $6\frac{1}{2}\%$ , and the latter a half-yearly dividend of  $6\frac{1}{4}\%$ , find his total income for the half-year.
6. Coffee, costing 35 cents per pound, is mixed with Chicory worth 10 cents a pound, in the proportion of 5 pounds of coffee to 2 pounds of chicory, and the mixture is sold for 34 cents a pound: find the gain %.
7. A person invests the present worth (true discount) of \$30,192 (due six months hence, at 4% per annum) in Bank stock paying 6% yearly interest and selling at  $92\frac{1}{2}$ ; his taxes amount to  $6\frac{2}{3}\%$  of his gross income from the above investment: find his net annual income.
8. A and B invest capital in the proportion of 4 to 5 in business; at the end of 6 months A withdraws  $\frac{2}{5}$  of his capital, and B  $\frac{3}{5}$  of his. At the end of the year there is found to be a gain of \$4,050; how is this to be divided?
9. (1.) In multiplication, why are the successive partial products not placed directly over one another?  
(2.) Can the multiplier be a concrete number? Explain clearly the meaning of the factors in  $5\text{ft.} \times 3\text{ft.} = 15 \text{ sq. feet.}$   
(3.) Is a fraction a number? Explain fully why  $\frac{3}{4}$  has the same value as  $\frac{1\frac{2}{3}}{1\frac{1}{3}}$ .
10. Find within an inch the length of a side of a square field which contains two acres.





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### COMPOSITION.

The candidates may select either of the following subjects :—

Newspapers.

Country and City Life.





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No. 12.

### ENGLISH LITERATURE.

1. Sketch the life and give an account of the works of Thomas Gray.
2. Name the principal writers contemporary with Gray, and give a brief account of the life of any one of them.
3.

“Some village-Hampden, that, with dauntless breast  
The little Tyrant of his fields withstood,  
Some mute inglorious Milton here may rest,  
Some Cromwell guiltless of his country's blood.”

*(i.)* Write notes on the proper names in the stanza quoted.  
*(ii.)* What is your opinion in regard to the charge brought against Cromwell in the last line? Support your answer with reasons.  
*(iii.)* Give an account of the metre of the Elegy, and scan the first two lines.  
*\*iv.)* Quote another passage from the Elegy expressing the same idea as the last two lines of this stanza.  
*(v.)* State in your own words the meaning of the stanza.
4. Make a list of Scott's metrical romances, and name other works of the same class produced by contemporary poets.
5. Give the substance of Canto 3 of the “Lady of the Lake,” introducing quotations where you can.
6.

“At length his rank the stranger names,  
The Knight of Snowdown, James Fitz-James;  
Lord of a barren heritage,  
Which his brave sires, from age to age,  
By their good swords had held with toil;  
His sire had fallen in such turmoil.”

Illustrate from history the statements contained in the last three lines.

[OVER.]



7. What is meant by these words ? ‘Cairn,’ ‘fealty,’ ‘requiem,’ ‘lea,’ ‘claymore,’ ‘truncheon,’ ‘liege,’ ‘beaker,’ ‘linn,’ ‘dhu,’ ‘bracken,’ ‘glaive.’

8. Refer to its place in the “Lady of the Lake” each of the following passages :—

“ ‘Twere worth ten years of peaceful life  
One glance at their array.”

“ One burnished sheet of living gold  
Loch Katrine lay beneath him rolled.”

“ Thou many-headed monster-thing  
O who would wish to be thy king ! ”

“ He rights such wrong where it is given,  
If it were in the court of Heaven.”

9.

“ Viewing the mountain’s ridge askance,  
The Saxon stood in sullen trance,  
Till Moray pointed with his lance,  
And cried—‘ Behold yon isle !—  
See ! none are left to guard its strand,  
But women weak, that wring the hand :  
’Tis there of yore the robber band  
Their booty wont to pile ;  
My purse with bonnet-pieces store,  
To him will swim a bow-shot o’er,  
And loose a shallop from the shore.’ ”

(i.) What mountain and what island are referred to ?

(ii.) Write explanatory notes on ‘ Moray ’ and ‘ bonnet-pieces.’

(iii.) Parse ‘ wont,’ ‘ bonnet-pieces,’ ‘ bow-shot,’ and ‘ o’er.’

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No. 13.

### EUCLID.

1. Distinguish accurately Axiom and Postulate, Problem and Theorem, Direct and Indirect Demonstration.
2. To bisect a given rectilineal angle, that is to divide into two equal angles.

Explain the meaning of the phrase “on the side remote from A.” Why is this limitation necessary?

3. Any two sides of a triangle are together greater than the third side.  
Prove this proposition without producing a side. The difference between any two sides is *less* than the third side.
4. The opposite sides and angles of a parallelogram are equal to one another, and the diameter bisects the parallelogram, that is divides it into two equal parts.  
The middle point of the greatest side in a right-angled triangle is equally distant from the three angles.
5. Equal triangles on the same base and on the same side of it, are between the same parallels.  
The line joining the middle points of any two sides of a triangle is parallel to the third side and equal to half of it.
6. If a triangle and a parallelogram be on the same base and between the same parallels, the parallelogram shall be double of the triangle.  
A D and B C are the only parallel sides in the quadrilateral A D B C, F is the middle point of D C.  
Show that the triangle A F B is half the quadrilateral.
7. If a straight line be divided into two equal, and also into unequal parts, the squares on the two unequal parts are together double of the square on half the line and of the square of the line between the points of section.  
Divide a straight line into two parts so that the square on one of them shall be equal to twice the square on the other.
8. Given half the perimeter of an isosceles triangle, and its verticle angle equal to one-third of a right angle, construct the triangle.





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No. 14.

### G E O G R A P H Y .

1. (*a*) State, and explain very briefly, the causes which modify the climate of a country. Give examples from Europe and America.  
(*b*) What are isothermal lines? Explain this statement: "On account of the extent of ocean, the isothermal lines in the southern hemisphere coincide more nearly with the parallels of latitude than in the northern."
2. How do you prove that the earth is round? Derive and define the terms Tropic, Sun's Declination, Meridian, Antarctic Circle.
3. (*a*) What are the productions and chief exports of Egypt, Brazil and Turkey? (*b*) What, and under what government are Manilla, the Tyrol, Teneriffe, Funchal, Aden, Formosa, Hungary, Minorca, Guadaloupe, Singapore, Queensland, Batavia, Otago, Nepaul?
4. Sketch a map of that part of the United States west of the Mississippi. Mark the capitals and chief rivers.
5. Name the races to which the inhabitants of Europe and Asia belong, specifying the portions chiefly occupied by each.
6. State accurately the position of Cairo, St. Hyacinthe, Mobile, Wexford, Khiva, Smyrna.





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No. 15.

### HISTORY.

1. (a) Describe with extreme brevity, introducing dates where you can, the English conquest of Britain.  
(b) Explain Mr. Green's remark, referring to this conquest: "What strikes us at once in the *new England* is, that it was the one purely German nation that rose upon the wreck of Rome."
2. What was the political condition of England at the accession of Henry III?
3. Name the sovereigns whose vices or follies were the source of great benefits to the English nation. Give instances.
4. Write a very brief sketch of the life and character of any *one* of these: Cardinal Wolsey, Lord Strafford, the Duke of Marlborough.
5. State, as accurately as you can, the position of the following places, and connect them with important events and dates in English history: Utrecht, Shrewsbury, Naseby, Fontenoy, Amiens, Lucknow.
6. Write short historical explanatory notes on "The Pilgrimage of Grace," "The Test Act," "The Treaty of Dover."
7. Explain the exact nature of Her Majesty's title to the British crown.
8. Name the principal events connected with the administration of the Count de Frontenac in Canada. Give dates.
9. What causes led to the Canadian Confederation in 1867?









